

Paludestrina ventrosa.

Radula measuring $60 \times 16 \mu$ and having 40-45 rows of seven teeth each.

Median (or rachidian) tooth (2.5μ in width) bears 7 cusps, of which the central one equals in length half the width of the crest of the tooth. Basal denticles one on each side, inconspicuous. The crest of the tooth viewed in its position in the radula is markedly concave.

Admedian tooth bears 9 cusps inclined inwards towards the median line of the whole radula; base prolonged outwards in a shank which reaches almost to the margin of the radula and which terminates in a thickened knob-like end.

Laterals long, slender, and curved, with numerous small cusps, which in the outer one are difficult to resolve. The inner lateral is more sharply curved at the point where the cusps cease; in the outer one the curve is far more symmetrical throughout.

$$\text{Formula: } \frac{M}{7} + \frac{1}{9} + \frac{2}{x}.$$

Paludestrina Jenkinsi.

Radula measuring $86-93 \times 20 \mu$ and having 60-70 rows of seven teeth each.

Median tooth bearing 9, or sometimes even 11, cusps, of which the central one is about one third the width of the crest. This last is less concave in outline than in *P. ventrosa*. Basal denticles four on either side, very conspicuous.

Admedian tooth bearing 9-11 cusps, inclined inwards, but slightly less so than in the preceding species; in other respects it is very similar.

Laterals long and slender, nearly straight in the shank, and sharply curved at the free end. Cusps numerous and easily visible.

$$\text{Formula: } \frac{M}{9-11} + \frac{1}{9-11} + \frac{2}{x}.$$

LVII.—*Observations on two rare British Nudibranchs* (*Lomanotus genoi*, *Verany*, and *Hancockia eudactylota*, *Gosse*). By F. W. GAMBLE, B.Sc., Assistant to the Beyer Professor of Zoology, Owens College, Manchester.

[Plate XVII.]

WHILE working last summer at the Plymouth Laboratory of the Marine Biological Association I obtained a single specimen of each of these species during successive weeks from

the same part of Plymouth Sound. Finding that my *Lomanotus* possessed certain peculiarities of which I could find no adequate description or figures, and that *Hancockia* had only been taken on one previous occasion on the British coasts (by Mr. A. R. Hunt in Tor Bay, 1877), I observed and drew the living animals with the following results.

Lomanotus genei, Verany. (Pl. XVII. figs. 1 and 2.)

Specimens referable to this species have been taken from time to time on our coasts. Mr. Garstang, in his recent report *, has collected these cases and added a number which have occurred at Plymouth. The following description of my own specimen agrees closely in certain points, such as size, colour, and general structure, with that of his two dark individuals †.

Length half an inch.

Colour dark brown, with irregular yellowish spots; the papillæ each with a dark band below a white tip. The general tint agreed closely with that of the *Fucus* on which I found it after being dredged, and upon which it lived in captivity.

Oral veil with two prominent processes on each side, the outer ones being the larger. Rhinophores retractile within calyx-like sheaths, clavate, laminated at the base, with smooth truncate tips. Sheath-margins each produced into five papillæ of very definite shape when expanded. These papillæ, like those of the oral veil and pleuropodium, are capable of contraction and dilatation. Pleuropodium consisting of four well-marked lobes on each side. The centre of each lobe is dorsal and close to the middle line. It is marked by the large dorsal papilla. The sides of the lobe extend anteriorly and posteriorly in a ventral direction, enclosing a slightly concave area, and bearing papillæ. Posteriorly the lobes become slightly irregular and meet on the dorsal surface. Foot slender, produced anteriorly into recurved processes. Genital aperture beneath and slightly in front of the first large dorsal papilla of the right side. Anus beneath the second.

My attention was first drawn to the characteristic form and changes of shape assumed by the dorsal papillæ. These changes consisted of contraction from an extended definite shape to a more or less bulbous triangular one. So far as I

* "Complete List of Plymouth Opisthobranchs," Journ. Mar. Biol. Assoc. (n. s.) i. no. 4.

† "Report on Nudibranchs of Plymouth Sound," Journ. Mar. Biol. Assoc. I. ii. 1889, p. 187.

am aware none of the terms used by previous authors on this subject do justice to the form of the extended pleuropodial papilla. The interest of the matter is increased by the fact that the tips of the "calyx-sheath" have the same power of contractility, and that their extended form agrees with that of the dorsal papillæ. The velar processes also when extended are of a very definite shape (see figs. 1 and 2).

On gently touching the centre of the right side of the animal with a clean sable brush three events occurred almost simultaneously; the rhinophores previously expanded were sharply retracted within their sheaths; the velar processes were extended; and the dorsal papillæ of the right side, especially those near the point of the brush, were erected from a previously oblique position, the large papillæ markedly directing their whitish tips towards the brush. The effect might be almost said to be "bristling." The papillæ of the left side were only feebly affected. On repeating the experiment at different points I found that when the stimulus is applied just behind the rhinophoral sheath the large postero-external sheath-papilla directed its tip obliquely backwards towards the point of attack, the first primary pleuropodial papilla directing its tip forwards. Several times I observed a single fully-expanded papilla move independently in an oblique plane from an anteriorly directed position to a posteriorly directed one. The "erection" and movement of the papillæ is brought about in the same way by natural stimuli. These movements led me to suspect the presence of cnidocysts. In spite, however, of the examination of the living animal and of sections of young specimens $\frac{1}{16}$ inch long (for the use of which, together with help in many ways, I am indebted to my friend Mr. Walter Garstang), I have hitherto been unsuccessful; indeed Bergh*, in his description of the genus, has stated "cnidocystæ nullæ" as a diagnostic character.

On some occasions I observed the peculiar lashing movements of the whole body already noticed by Mr. Garstang †. Thus, on pushing the animal laterally with a brush until its foothold gave way, it bent upon itself and executed a series of very vigorous S-shaped movements from side to side, the ventral surface of the foot being kept at about the same position on the surface of the water, the rest of the body inverted downwards. On another occasion it voluntarily

* "Die Cladohepatischen Nudibranchien," Zool. Jahrbücher, Bd. v. (1890).

† "First Report on Nudibranchs of Plymouth Sound," Journ. Mar. Biol. Assoc. (n. s.) I. ii. 1889, p. 189.

loosened its hold of the side of the glass vessel and progressed slightly by means of these contractions. Again, after floating foot upwards for some time, it would wriggle to the bottom and immediately gain a footing.

My specimen was quiet during the day. In the morning I found that it had crawled out of the dish where it had been placed overnight. This was done constantly, and indicates nocturnal habits. During the three weeks that I kept my specimen no spawn was deposited; hence probably it was immature.

As regards the significance of these observations. Continual changes of form in the pleuropodial papillæ during life have been noticed by Dr. Norman in his species, *L. Hancocki**. The complete similarity, however, both in characteristic form and power of coordinative movement possessed by these papillæ in common with those of the "calyx-sheath" apparently escaped him, and is an additional argument in favour of the view advanced by Mr. Garstang †, that such sheaths contain a "pleuropodial element."

Hancockia eudactylota, Gosse. (Pl. XVII. fig. 3.)

A specimen of this species was dredged last summer (1891) on *Delesseria* in Plymouth Sound, as I have already recorded ‡. Mr. Hunt, the original discoverer of this form, dredged the only previous British specimen on the same Alga in Tor Bay in 1877. This was described by Mr. Gosse § under the name *Hancockia eudactylota*. In 1886 Prof. Trinchese, apparently in ignorance of Gosse's paper, described ("Ricerche Anatomiche sul Genere *Govia*" ||, 1886) four specimens dredged near Naples, defining them as two species of a new genus, *Govia rubra* and *G. viridis*. Although the internal anatomy of *Hancockia* is unknown, it seems probable that the genera *Govia* and *Hancockia* will be united, as indeed has been done by Dr. Norman in his "Revision" (this Journal, vol. vi. 1890, pp. 79, 80). Carus ('Prodrömus Faunæ Mediterraneæ,' vol. ii. pt. 1, p. 208) writes the genus *Govia*, Trinch., adding in brackets (*Hancockia*, Gosse).

The Plymouth specimen was about a quarter of an inch in

* Norman, Ann. & Mag. Nat. Hist. 1877, xx. p. 518.

† "Complete List of Opisthobranchs at Plymouth," Journ. Mar. Biol. Assoc. (n. s.) i. no. 4, p. 430.

‡ "The Occurrence of *Hancockia* at Plymouth," *ibid.* (n. s.) vol. ii. no. 2, p. 193.

§ Ann. & Mag. Nat. Hist. ser. 4, vol. xx. 1877, p. 316.

|| Mem. della R. Acc. delle Sc. dell' Instituto di Bologna, ser. 5, vol. vii.

length when expanded. This is only half the length of Mr. Hunt's specimen. Colour a purplish-rose, very similar to the *Delesseria* on which it lived. Too much stress should not be laid on this point, however, since Mr. Hunt's example, although apparently found on the same weed *, was olive in colour. The mid-dorsal and lateral lines of the upper surface darker. The epidermis of the upper surface is of a bluish-green hue, as Gosse has already noticed (*loc. cit.* p. 317). On the sheaths of the rhinophores are scattered bluish-white spots; semilunar markings of the same kind occurred at the base of the pleuropodial lobes (compare Trinchese's figure of *Govia rubra*). Body widest behind the head, gradually tapering posteriorly. Head with an oral veil bearing four papillæ on each side, the second anterior one being the largest. These papillæ were constantly changing their shape during life, as Gosse and Trinchese have recorded. Rhinophoral sheaths erect, cylindrical, the margin subdivided into about ten rounded projections. This agrees closely with the figure and description of the sheaths of *Govia viridis*. Those of *G. rubra*, on the other hand, have plain margins. Rhinophores with a rounded, bulbous, laminated base, terminating above in a smooth columnar tip. Pleuropodium produced into four lobes on the right and five on the left, the fifth being rudimentary. The first pair of lobes are opposite, the rest gradually becoming alternate, as in Trinchese's figure of *Govia rubra*. Each lobe is concave externally and is composed of seven papillæ, one being dorsal and median, three anterior, and three posterior. The foot is rounded anteriorly, posteriorly it ends in a slightly bifid tail, as in *Govia* (Trinchese, *loc. cit.* p. 183 and my fig. 1). The anal papilla very small, cylindrical, situated halfway between the first and second lobes of the right side. Genital opening near dorsal surface between the rhinophore and the first dorsal lobe of the right side.

In the appended table I have compared the different specimens of *Hancockia* and *Govia*. Although they all agree in main points, no two individuals do so in detail.

* Gosse, *loc. cit.* p. 316, note.

	Name.	Length.	Colour.	Characters of Velar Papillae.	Margin of Pleurophoral Sheath.	Pleuropodium.		
						Characters.	Number of Lobes.	
						Right side.	Left side.	
1.	<i>Goiva rubra</i> , Tr.	10 mm.	Purplish rose. Brightest on rhinophoral sheaths, dorsal and velar papillae. Dorsal surface with irregular white spots.	5 on each side; 3 large lateral, 1 small anterior and posterior.	Plain.	Lobes of 7-8 papillae.	5; the 5th most posterior.	5
2.	<i>G. rubra</i> , Tr.	13 mm.	Colour as in No. 1.	4 on each side.	Plain.	Lobes of 7-8 papillae.	5	6; the 6th most posterior.
3.	<i>G. rubra</i> , Tr.	Not given.	Bright chestnut. White spots forming a line marking position of pleuropodial ridge.	5 on each side.	Plain.		Number not stated.	
4.	<i>G. viridis</i> , Tr.	14 mm.	"Verde pistacchio."	4 on each side.	Divided into about 10-12 rounded projections.		3	4
5.	<i>Hancockia eudactyloba</i> , Gosse. Mr. Hunt's specimen.	12.5 mm.	Olive. Gosse figures whitish spots marking the pleuropodial ridge, becoming more irregular posteriorly.	3-4 on each side alternating with as many small ones (Gosse, <i>loc. cit.</i> , p. 317).	Furnished with subconical points along its edge.	Lobes of 11 irregularly notched leaflets.	3	3
6.	<i>H. eudactyloba</i> , Plymouth specimen.	7 mm.	Purplish rose. White spots at base of pleuropodial lobes as in <i>Goiva</i> .	4 on each side.	Divided into about 10 rounded projections.	Lobes of 7 papillae.	4	5; the 5th most posterior.

From this table it would appear that *Goiva rubra*, Tr., differs specifically from *G. viridis*, which may hereafter be united with

Our knowledge of the internal anatomy of these forms is limited to the preliminary paper by Prof. Trinchesi before referred to. The cutting-edge of the jaw is short and armed with a single series of 15-16 teeth, the first two or three of which are simple, the rest set with extremely fine tubercles. Radula triseriate; the teeth of the median row with lateral denticles; the lateral teeth broad, unarmed ("quasi omnino illi Galvinarum similis," Bergh *). Salivary glands large. Liver diffuse, with anterior and posterior branches, the latter supplying the dorsal papillæ. The nervous system similar to that of *Æolidiidae*. Eyes well developed. Otocysts with a single otolith. Penis unarmed. The spermatozoa similar to those of *Æolidiidae*. *Hancockia* appears to be mature when about half an inch in length. Trinchesi describes ripe generative products at this stage, and Gosse has figured and described the spawn deposited by a specimen of this size. The ribbon was in the form of two complete figure-of-eight coils, the ova being irregularly scattered. My specimen was only a quarter of an inch long, and during the fortnight that I kept it no spawn was shed.

I stimulated *Hancockia* to see if the dorsal papillæ would respond, as they do in *Lomanotus*; no effect, however, followed. The presence of endocysts in the genus described by Trinchesi as occurring at the tips of the pleuropodial lobes (*loc. cit.* pp. 186, 189, and plate, figs. 8 and 14) makes its behaviour contrast still more with that of *Lomanotus*.

While gliding over the bottom of the vessel in which it lived it would sometimes stop, raise the anterior part of the body, and, with the velar tentacles and the rhinophores well expanded, it would sway from side to side. In a short time the action ceased and the animal went straight to the *Delesseria* on which it lived. Unfortunately I made no experiments to ascertain whether *Hancockia* responds to shadows as stimuli. The large eyes noted by Trinchesi would be in favour of such reaction. *Hermæa bifida*, which lives on *Delesseria*, and certain Eolids have been shown by Mr. Garstang to respond †.

As regards the systematic position of *Hancockia*. Gosse placed it in the Tritoniidæ; Trinchesi, Bergh, Norman ‡, and Carus place it in the Dotonidæ; Bergh, however, adding: "Bei der Formulirung der Charaktere der Dotoniden ist auf

* "Die Cladohepatischen Nudibranchien," Zool. Jahrb. v. p. 53.

† Garstang, "Complete List of Plymouth Opisthobranchs," Journ. Mar. Biol. Assoc. (n. s.) i. no. 4, p. 423.

‡ "Revision of British Mollusca," Ann. & Mag. N. H. vol. vi. 1890, p. 79.

die Hancockien oder Govien keine Rücksicht genommen, weil die Stellung dieser merkwürdigen, gleichsam mehrere Familien verbindenden Gattung, bei der bisherigen nur vorläufigen Untersuchung Trinchese's, noch ganz unsicher ist." I will only allude here to one view implied rather than expressed by Mr. Garstang*. He compared a lobe of the pleuropodium of *Hancockia* with one of the four arcuate lobes of the "raised curtain" forming the pleuropodium in *Lomanotus*. The side view which I give of the latter genus shows that the lobes are distinct and that the breaks occur between the segments having the large dorsal papillæ as their centres (Pl. XVII. fig. 2).

EXPLANATION OF PLATE XVII.

- Fig. 1.* Plymouth specimen of *Lomanotus genei*, Ver., seen from the dorsal surface. $\times 6$. The papillæ are extended.
Fig. 2. The same, from the right side. $\times 6$. Papillæ about $\frac{3}{4}$ expanded. *a*, genital papilla; *b*, anal papilla. These were inserted from the preserved specimen.
Fig. 3. Plymouth specimen of *Hancockia eudactylota*, Gosse, from dorsal surface. $\times 14$. In this view only three papillæ of each pleuropodial lobe are shown.

LVIII.—On two new Central-African Antelopes obtained by Mr. F. J. Jackson. By OLDFIELD THOMAS.

By the kindness of Messrs. Rowland Ward and Co., of Piccadilly, I have been entrusted with the examination of the skulls and scalps of two antelopes, a Hartebeest and a Wildebeest, sent home by the well-known explorer and naturalist Mr. F. J. Jackson.

Although probably in neither case, as will be seen below, are these specimens absolutely the first of their respective forms which have been sent to Europe, both seem to require new names, the one specific and the other subspecific.

Firstly, with regard to the Hartebeest. In 1859 Mr. Petherick sent home from the Bahr el Gazal "several heads of both sexes" of a Hartebeest referred by Dr. Gray † to *Alcelaphus bubalis*, but of which a female skull, the only remnant of the series now in the British Museum, appears to belong to

* *Ibid.* p. 429.

† Ann. & Mag. Nat. Hist. (3) iv. p. 296 (1859).